

## CLAIMS

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### WHAT IS CLAIMED IS:

1. A calibratable force-measuring and force-applying clamp, comprising:
  - an adjustable clamp, said adjustable clamp adjustably applying force to a workpiece object;
  - a strain gage coupled to said adjustable clamp and detecting elastic deformation in said adjustable clamp when said adjustable clamp applies force to said workpiece object, said strain gage transmitting a strain signal;
  - a data acquisition circuit coupled to said strain gage and receiving said strain signal, said data acquisition circuit transmitting a data signal and having a span circuit and a zero circuit; and
  - a display coupled to said data acquisition circuit, said display receiving said data signal and displaying symbols characterizing an amount of force applied to said workpiece object by said adjustable clamp; whereby force applied by said adjustable clamp to said workpiece object may be calibrated for a zero point and a load point to enable precise and accurate determination of applied force.
2. A calibratable force-measuring and force-applying clamp as set forth in Claim 1, wherein said adjustable clamp incorporates said strain gage, said data acquisition circuit, and said display.
3. A calibratable force-measuring and force-applying clamp as set forth in Claim 1,

2 wherein said strain gage further comprises a full bridge strain gage.

4. A calibratable force-measuring and force-applying clamp as set forth in Claim 1,

2 wherein said data acquisition circuit further comprises:

an amplifier; and

4 a voltage reference source, said voltage reference source coupled to said  
amplifier via said strain gage.

5. A calibratable force-measuring and force-applying clamp as set forth in Claim 4,

2 wherein said data acquisition circuit further comprises:

4 a monolithic chip incorporating both said amplifier and said voltage  
reference source.

6. A calibratable force-measuring and force-applying clamp as set forth in Claim 4,

2 wherein said span circuit is coupled to and controls gain of said amplifier.

7. A calibratable force-measuring and force-applying clamp as set forth in Claim 6,

2 wherein said span circuit is a potentiometer coupled across inputs to said amplifier.

8. A calibratable force-measuring and force-applying clamp as set forth in Claim 4,

2 wherein said zero circuit is coupled to and affects output of said voltage reference  
source.

9. A calibratable force-measuring and force-applying clamp as set forth in Claim 8,

wherein said zero circuit is a potentiometer coupled across connections to said voltage reference source.

10. A calibratable force-measuring and force-applying clamp as set forth in Claim 9,

wherein a wiper of said zero circuit coupled to said strain signal.

11. A calibratable force-measuring and force-applying clamp, comprising:

an adjustable clamp, said adjustable clamp adjustably applying force to a workpiece object;

a strain gage coupled to said adjustable clamp, said strain gage including a full bridge strain gage and detecting elastic deformation in said adjustable clamp when said adjustable clamp applies force to said workpiece object, said strain gage transmitting a strain signal;

a data acquisition circuit having a span circuit and a zero circuit and including an amplifier and a voltage reference source incorporated into a monolithic chip, said amplifier coupled to said voltage reference source via said strain gage, said data acquisition circuit coupled to said strain gage and receiving said strain signal, said amplifier transmitting a data signal;

said span circuit being a first potentiometer coupled across inputs to said amplifier and controlling gain of said amplifier;

said zero circuit being a second potentiometer coupled across connections to said voltage reference source, a wiper of said zero circuit

coupled to said strain signal, said zero circuit affecting output of said strain  
signal;

a display coupled to said data acquisition circuit, said display receiving  
said data signal and displaying symbols characterizing an amount of force  
applied to said workpiece object by said adjustable clamp; and

said adjustable clamp incorporating said strain gage, said data acquisition  
circuit, and said display; whereby

force applied by said adjustable clamp to said workpiece object may be  
precisely and accurately determined by inspection of said display.

12. A force-measuring and force-applying clamp, comprising:

an adjustable clamp, said adjustable clamp adjustably applying force to a  
workpiece object;

a strain gage coupled to said adjustable clamp and detecting elastic  
deformation in said adjustable clamp when said adjustable clamp applies force to  
said workpiece object, said strain gage transmitting a strain signal;

data acquisition circuit having an amplifier coupled to a voltage reference  
source across said strain gage, said data acquisition circuit receiving said strain  
signal, said data acquisition circuit transmitting a data signal; and

a display coupled to said data acquisition circuit, said display receiving  
said data signal and displaying symbols characterizing an amount of force  
applied to said workpiece object by said adjustable clamp; whereby

force applied by said adjustable clamp to said workpiece object may be

precisely and accurately determined.

13. A calibratable force-measuring and force-applying clamp as set forth in Claim 12, wherein said data acquisition circuit has a span circuit and a zero circuit, said span circuit coupled to said amplifier and said zero circuit coupled to said voltage reference source.

14. A calibratable force-measuring and force-applying clamp as set forth in Claim 12, wherein said adjustable clamp incorporates said strain gage, said data acquisition circuit, and said display.

15. A calibratable force-measuring and force-applying clamp as set forth in Claim 12, wherein said strain gage further comprises a full bridge strain gage.

16. A calibratable force-measuring and force-applying clamp as set forth in Claim 12, wherein said data acquisition circuit further comprises:

a monolithic chip incorporating both said amplifier and said voltage reference source.

17. A calibratable force-measuring and force-applying clamp as set forth in Claim 13, wherein said span circuit controls gain of said amplifier.

18. A calibratable force-measuring and force-applying clamp as set forth in Claim

2 17, wherein said span circuit is a potentiometer coupled across inputs to said amplifier.

19. A calibratable force-measuring and force-applying clamp as set forth in Claim

2 13, wherein said zero circuit affects output of said voltage reference source.

20. A calibratable force-measuring and force-applying clamp as set forth in Claim

2 19, wherein said zero circuit is a potentiometer coupled across connections to said voltage reference source.

21. A calibratable force-measuring and force-applying clamp as set forth in Claim

2 20, wherein a wiper of said zero circuit coupled to said strain signal.